A method and a device for advancing essentially rectangular pieces of cloth to a feeder

The present invention relates to a method of advancing essentially rectangular pieces of cloth to a feeder according to the preamble of claim 1. The invention further relates to a device for advancing essentially rectangular pieces of cloth to a feeder according to the preamble of claim 8.

Feeding of essentially rectangular pieces of cloth to a feeder often takes place with the purpose of having washed and still moist pieces of cloth straightened before being taken through a laundry apparatus such as eg a rotary ironer. To this end a feeder is provided before the laundry apparatus. The pieces of cloth are taken one at a time from a pile of pieces of cloth and are arranged in conveyor clamps for being conveyed to a feeder.

Thus EP 0 982 428 A1 teaches a method and a device for advancing pieces of cloth to a laundry machine. At an inlet station each individual piece of cloth is seized manually by an operator and two opposed corners of a side edge is found. Then the corners of the piece of cloth are arranged in two successive conveyor clamps that are configured in an advancement conveyor. The piece of cloth, which is arranged in the two successive conveyor clamps, are conveyed "laterally" to a buffer storage. The buffer storage is often integral with a conveyor rail that constitutes a part of the advancement conveyor. From the buffer storage the pieces of cloth are taken one at a time to a feeder for being fed to a rotary ironer. At the front of the feeder, the pieces of cloth are transferred from the conveyor clamps of the advancement conveyor to spreader clamps configured in the feeder. The spreader clamps serve to straighten the piece of cloth at the front, transversally to the direction of conveyance of the feeder, following which the straightened piece of cloth is conveyed into the feeder and on into the rotary ironer.

The method according to the prior art, however, presupposes disproportionately much manual handling of the individual piece of cloth. First, each individual piece of cloth is to be seized by an operator and two adjacent corners of a side edge of the piece of cloth are to be found prior to the corners being subsequently arranged in two successive conveyor clamps. Moreover, since the pieces of cloth are frequently mixed up in piles of both large and small pieces of cloth, the respective cycle times are not necessarily the same for the large pieces of cloth and the small pieces of cloth. The cycle time per piece of cloth thus varies in response to the type/size of piece of cloth, and since moreover the cycle time is comparatively long it is necessary to configure several inlet stations with each their operator to even out these differences. Not until then is it possible to feed sufficiently many pieces of cloth to utilize the capacity of the advancement conveyor optimally.

Thereby one of the drawbacks of an advancement system becomes apparent since, in order to be able to use the increase in capacity which is enabled by an advancement conveyor to advantage, it is necessary that the limitation in capacity of the system is transferred to the inlet stations where the pieces of cloth are arranged in the conveyor clamps.

Increase in capacity is a general object of such advancement systems that are used for advancing pieces of cloth to a feeder. Therefore it is an aim to reduce the operator time (cycle time) per piece of cloth, whereby – from an overall point of view – less operator time is required, or to achieve increased productivity per operator.

It is therefore an object of the invention to provide a method and a device, by which the drawbacks of the prior art are obviated, and whereby an increase in capacity is also achieved compared to the prior art.

This is accomplished by the method according to the characterising part of claim 1 and by the device according to the characterising part of claim 8.

It is hereby accomplished that the manual handling of the pieces of cloth is reduced in that the operator time (cycle time) for the individual piece of cloth is reduced. This is enabled in that the operator is to find only an edge of the piece of cloth which is subsequently to be arranged in a pair of conveyor clamps. Precisely due to the straightened edge describing a well defined section of the piece of cloth which can, in a simple and easy manner, be arranged/mounted in the securing means by a simple movement, the operator time for the individual piece of cloth can be reduced considerably.

The method and the apparatus according to the invention can advantageously be used for feeding pieces of cloth to a feeder of the type which is known ia from WO 00/66828.

According to a preferred embodiment of the method, the piece of cloth is transferred from a transfer position configured in a inlet station for the securing means, in that the securing means are conveyed to a position between two parallel sandwich conveyor belts configured in the direction of conveyance of the inlet station; and wherein the straightened edge of the piece of cloth is mounted in the securing means in the transfer position during advancement of the piece of cloth by the sandwich conveyor belts from a feeding position configured in the direction of conveyance opposite the transfer position. Hereby it is advantageously accomplished that the mounting of the piece of cloth in the securing means can be automated and further simplified as the extended fore edge of the piece of cloth is arranged in the feeding position, following which the sandwich conveyor belts advance the piece of cloth to the transfer position, where the straightened edge is taken over by the securing means.

According to a further preferred embodiment of the method, the piece of cloth is conveyed on the endless conveyor rail with the straightened edge arranged transversally to the direction of conveyance or essentially transversally of the direction of conveyance. Hereby a method is accomplished by which it is advantageous in particular cases to transport a straightened edge of the piece of cloth on an endless conveyor rail.

According to a further preferred embodiment of the method, the piece of cloth is transferred from the securing means on the conveyor to the feeder in that the straightened edge on the piece of cloth is conveyed between a superjacent and a subjacent conveyor belt configured at the end of a bar, said bar being arranged transversally in relation to a direction of conveyance on the feeder. Hereby a method is accomplished by which it is advantageous in particular cases to transfer the piece of cloth from the securing means on the conveyor to the feeder.

According to yet a preferred embodiment of the method a plurality of pieces of cloth are mounted on each their rail conveyor; and wherein each rail conveyor with a piece of cloth is subsequently conveyed out on the endless conveyor rail, where the rail conveyors with pieces of cloth form a buffer stock; and wherein the conveyor with the piece of cloth is conveyed out of the buffer stock for being fed to the feeder. Hereby a method is accomplished which is advantageous in particular cases in connection with the advancement of pieces of cloth to a feeder.

According to yet a preferred embodiment of the method, the rail conveyor with the piece of cloth is conveyed onto a section of the conveyor rail and conveyed to another feeder. Hereby a method is accomplished which is advantageous in particular cases in connection with the advancement of pieces of cloth in advancement systems that comprise a first feeder and a second feeder.

According to a further preferred embodiment of the invention the securing means comprise a pair of conveyor clamps that are arranged on the rail conveyor at a distance from each other and along an axis perpendicular to the direction of conveyance of the rail conveyor or essentially perpendicular to the direction of conveyance of the rail conveyor. Hereby a pair of conveyor clamps is accomplished which is particularly advantageously used in connection with advancement of pieces of cloth to a feeder by securing of a straightened section of edge of the piece of cloth.

According to a further preferred embodiment of the invention the securing means are configured for securing the straightened edge of the piece of cloth in a position transversally to the direction of conveyance, or essentially transversally to the direction of conveyance. Hereby securing of the straightened edge of the piece of cloth is accomplished in a position which is advantageous in particular cases.

According to a further preferred embodiment of the invention the endless conveyor rail comprises a buffer area which buffer area is configured in the direction of conveyance on the conveyor rail between a inlet station and said feeder. Hereby a temporary storage of pieces of cloth on conveyor rail is accomplished which is advantageous in that particular case.

According to yet a further preferred embodiment of the invention, the endless conveyor rail comprises a buffer area configured on the conveyor rail between the feeder and the inlet station. Hereby temporary storage of pieces of cloth on conveyor rail is accomplished which is advantageous in other particular cases.

According to yet a further preferred embodiment of the invention the conveyor rail comprises a switching or one or more switchings. Hereby it is

accomplished that a rail conveyor can be conveyed onto a rail section and that the rail sections can be divided into advantageous subsections.

The invention will now be explained with reference to the drawing, wherein:

Figure 1 is a schematic perspective view of a laundry area with an inlet section, an endless conveyor rail comprising a plurality of rail conveyors and a feeder configured in connection with a rotary ironer; and

Figure 2 shows a section of an inlet station; and

Figure 3 shows a section of a feeder seen from one end of a transverse bar; and

Figure 4 is a schematic sketch of a pair of conveyor clamps.

The configuration shown in Figure 1 serves the purpose of advancing laundered, essentially rectangular pieces of cloth 5 such as eg sheets, tablecloths, bed linen and the like to rotary ironing in a rotary ironer 10. The device comprises an endless conveyor rail 21, on which conveyor rail 21 a plurality of rail conveyors 30 comprising conveyor clams 31 that are configured in pairs are conveyed around in a conveyor device 16 on the conveyor rail 21. The direction of conveyance of the rail conveyor 30 around the conveyor rail 21 is shown by arrows 16.

In the following, reference is made to figures 1, 2 and 3. Figure 1 shows a principle sketch of a conveyor rail system for advancing pieces of cloth 5 for being fed to a feeder 60. The conveyor rail system comprises an advancement side and a return side, wherein the advancement side is defined by the rail sections that are configured in the direction of conveyance 16 between the inlet stations 12a, 12b and the feeder 60, and wherein the

return side is defined by the rail sections that are configured between the feeder 60 and the inlet station 12a, 12b in the direction of conveyance 16.

At the beginning of the advancement process the conveyance rail 21 comprises rail sections 22a, 22b. Each rail section 22a, 22b comprises a U-shaped course 23a, 23b that extends downwards and upwards in a vertical plane. For each U-shaped course an inlet station 12a, 12b is configured. Against the direction of conveyance 16 of the conveyor rail system, away from the inlet stations 12a, 12b, the rail sections 22a, 22b each comprises a 180°-curve course 24a, 24b that first extends away from the inlet stations 12a, 12b and again towards and past the inlet stations 12a, 12b in a horizontal plane. At their ends, rail sections 22a, 22b are connected to a common rail section 25 on the advancement side and on the return side rail sections 22a, 22b are connected on another common rail section 28.

On the advancement side the common rail section 25 divides into two inlet sections 26a, 26b that each leads to a feeder 60. Each inlet section 26a, 26b comprises a U-shaped course 27a, 27b that extends downwards and upwards in a vertical plane. The U-shaped courses 27a, 27b are configured for conveying rail conveyors 30 with secured pieces of cloth 5 from an elevated horizontally extending rail section down in level with the feeder 60. More specifically the rail conveyor 30 is conveyed downwards at a superjacent and subjacent conveyor belt configured at the end of a bar 65. The bar 65 is positioned transversely in relation to a direction of conveyance 61 on the feeder 60. The bar 65 is arranged at a fore edge of the feeder and is configured for pieces of cloth to be conveyed inwards from an end of the bar and across the bar, following which they are conveyed in the direction of conveyance 61 of the feeder into the feeder 60 and on into a subsequent rotary ironer 10. In the direction of conveyance at the end of the U-shaped course 27a, 27b, rail sections 26a, 26b assemble in a rail section 28 which

again branches into two rail sections 22a, 22b that lead past the inlet stations 12a, 12b.

In connection with each U-shaped course 27a, 27b an endless conveyor belt 50 is configured which is provided with a plurality of conveyance means for conveying the rail conveyors 30 around on the U-shaped course 27a, 27b. The conveyance means are advantageously mounted at the same distance from each other on the endless conveyor belt 50. The endless conveyor belt 50 comprises drive means for driving the conveyor belt 50 around in the direction of conveyance 16 of the rail conveyor. The drive means are configured for receiving signals from a signal emitter 66 mounted in connection with the rail section 27a, 27b and moreover receiving signals from a signal emitter (not shown) in the feeder 60, whereby continuous supply of pieces of cloth to the feeder 60 is accomplished.

On the advancement side the rail sections are advantageously configured with a vertical drop from the inlet stations 12a, 12b and onwards to the feeder, and on the return side the rail sections are advantageously configured with a vertical drop from the feeder 60 and onwards to the inlet stations 12a, 12b. Hereby it is enabled that the rail conveyors 30 are able to use the slope on the rail sections to advantage and "roll" down the rail sections.

Figure 1 shows two inlet stations 12a, 12b that may each be completely or partially staffed with an operator 11. However, in particular cases, more inlet stations 12a, 12b may be provided, and likewise the number of feeders 60/rotary ironers 10 and inlet stations 12a, 12b will be adapted to the concrete operating scenario.

In the example shown in Figure 1, both inlet stations 12a, 12b are staffed with operators 11 that each individually introduces laundered pieces of cloth

5 in a position of introduction 13 onto the inlet station 12. Thus, the operator 11 seizes a piece of cloth 5 and finds a section of an edge of the piece of cloth 5. The section of the edge is straightened and the edge conveyed at the inlet position 13 into two parallel sandwich conveyor belts 17. The piece of cloth 5 is conveyed to a transfer position 14 configured in the direction of conveyance 18 opposite the position of introduction 13.

Since a U-shaped course 23a, 23b is configured that extends in a vertical plane at each inlet station 12a, 12b, the rail sections 22a, 22b are conveyed down in a level with the transfer position 14. More specifically, the securing means 31 are conveyed in between the two parallel sandwich conveyor belts 17 at the transfer position 14. The securing means are advantageously two conveyor clamps 31 that are mounted at a distance from each other in such a manner that the conveyor clamps are able to take over and secure the edge of the piece of cloth 5 in straightened state.

At the transfer position 14, the straightened edge of the piece of cloth 5 is transferred to a pair of conveyor clamps 31 that are mounted on a rail conveyor 30 and are conveyed in the direction of conveyance 16 along rail section 22a, 22b to the subsequent rail section 25. Then the rail conveyor 30 with the piece of cloth 5 is taken through a switching 27 and can thus be conveyed out onto either rail section 26a or rail section 26b.

The feeder 60 is configured for the pieces of cloth 5 to be conveyed into the feeder 60 at a side in parallel with the direction of conveyance 61 of the feeder. The transfer of a piece of cloth 5 from the rail conveyor 30 takes place by the piece of cloth being taken down into the curvature 51 of the U-shaped course where the straightened edge of the piece of cloth is conveyed in between a superjacent endless conveyor belt 63 and a subjacent endless conveyor belt 64 at an end of the transverse bar 65 on the feeder 60.

The superjacent endless conveyor belt 63 is configured at an end of the bar 65 and comprises a direction of movement 64a which is in parallel with the expanse of the bar transversally of the direction of conveyance 61 of the feeder 60. The subjacent endless conveyor belt 64 extends on a horizontal top face of the bar 65 and has an expanse essentially in the expanse of the bar transversally to the direction of conveyance 61 of the feeder 60. The superjacent endless conveyor 63 and the subjacent endless conveyor belt 64 is configured with a direction of conveyance 64a that causes the pieces of cloth 5 to be taken across the bar 65. Moreover the feeder 60 comprises means for conveying the piece of cloth in the direction of conveyance 61 of the feeder into the subsequently arranged rotary ironer 10.

On the advancement side a buffer area can advantageously be provided for temporary storage of a plurality of rail conveyors comprising transport clamps with pieces of cloth to be advanced to the feeder 60. The buffer area will in some cases advantageously be configured on the rail section 25. In particular cases the buffer area is advantageously configured on the two inlet sections 26a, 26b that each individually leads to a feeder 60.

On the return side a buffer area for temporary storage of a plurality of rail conveyors is provided comprising transport clamps so as to allow continuously supply of "empty" rail conveyors 30 to the inlet stations 12. In some cases the buffer area will advantageously be configured on the rail section 28. In other cases the buffer area is advantageously configured on rail sections 22a, 22b.

Thus Figure 4 shows a schematic sketch of a pair of conveyor clamps 31 comprising clamp means 31a. The conveyor clamps 31 are mounted with the clamp means 31a pointing in the same direction at the ends of a carrier beam 71. Relative to the direction of conveyance of the conveyor clamps mounted on the rail conveyor the clamp means 31a are arranged to point in a direction

opposite that of the conveyance, which is indicated in the drawing by the arrow 16. The connection to the rail conveyor is indicated by the reference numeral 71.

Conveyor clamps 31 are arranged on the rail conveyor 30 at a distance from each other, and along an axis X which is perpendicular to the axis of conveyance 16 of the rail conveyor or is essentially perpendicular to the direction of conveyance 16 of the rail conveyor. Pieces of cloth 5 that are conveyed around up the endless conveyor rail are squeezed in place by the clamp means 31a. A straightened edge of the piece of cloth will thus be secured between the conveyor clamps 31. In the drawing the straightened edge is indicated by the distance 75.